

Analysis on Development of Monodisperse Porous/Hollow Metal Oxide Nanoparticles through Solvothermal Process

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Porous/hollow nanostructures are of great interest in many areas of technology. Metal oxide nanoparticles such as Fe_3O_4 and TiO_2 with porous/hollow structure have been synthesized through a one-pot and template-free solvothermal process. Time-dependent experiments suggested that the formation mechanism comprised several different steps including the generation of spherical particles by gathering of many tiny grains and the development of hollow structure based on the chemical conversion simultaneously coupled with the Ostwald ripening process within these spherical assemblies. We supposed that the chemical conversion might cause the non-uniformities of tiny grains and the empty spaces within the spherical assemblies and thus enhanced the outward migration and relocation of the core grains toward the outer layer, resulting in the formation and development of the porous/hollow structure.